REMARKS

In the Office Action, claims 1-10 and 12-23 were rejected. All of the claims are believed to be patentable for the reasons summarized below. Reconsideration and allowance of all pending claims are requested.

Rejections Under 35 U.S.C. § 103

Claims 1, 4-6, 7, 9-14 and 18-22 are rejected under 35 U.S.C. §103(a) as being unpatentable over Charron, U.S. Patent No. 4,770,161 in view of Casey et al. (hereinafter "Casey"), U.S. Patent 6,705,533. Rejected claims 1, 10, 17 and 19 are independent and will be discussed in detail below.

Claim 1 recites an electronically controlled gas burner system. The system includes at least one gas burner and a micro-electro-mechanical valve comprising a plurality of microvalves in parallel fluid communication with the gas burner. The system also includes a microvalve controller for controlling the opening of each of the microvalves in the micro-electro-mechanical valve.

Claim 10 recites an electronically controlled gas burner system. The system includes at least one gas burner. The system also includes a micro-electro-mechanical valve comprising a plurality of independently controllable microvalves in parallel fluid communication with the gas burner.

Claim 17 recites a gas valve comprising a plurality of microvalves in parallel fluid communication with a gas burner of a cooking appliance.

Claim 19 recites a method of controlling gas flow to a gas burner. The method includes issuing a command for a desired gas flow and controlling opening of at least some of a plurality of independently controllable microvalves in parallel fluid communication to provide the desired gas flow corresponding to the command.

Charron does not teach use of a micro-electro-mechanical (MEMS) valve for providing a variable gas flow control for a gas burner.

Applicants submit that in accordance with certain of the claims, the invention uses a MEMS valve for providing a variable gas flow control for a gas burner. In particular, the MEMS valve includes a plurality of independently controllable microvalves in parallel fluid communication with the gas burner. The opening of each of the microvalves in the MEMS valve is controlled via a microvalve controller.

The Examiner argued that Charron discloses substantially all of the claimed limitations, including a burner system, micro-electro-mechanical valves 37, 39 and a controller with modulation. *See* Office Action, page 4.

Applicants submit that Charron does not teach the use of a MEMS valve in the gas water heater disclosed. Rather, Charron teaches that the intake to the burner is controlled successively by a *gas valve* 37 mounted on a rod connected to the center of a membrane and then by a differential pneumatic valve. Further, the gas valve 39 mounted on the rod controls the intake of gas to a main pilot light through a duct. *See* Charron, col. 3, lines 1-7. However, none of these elements remotely qualifies as a MEMS valve, and indeed Charron does not teach the valves 37 and 39 to be MEMS valves.

Valve assemblies disclosed in Charron and Casey are not compatible.

As discussed above, Charron does not teach use of a MEMS valve for controlling a gas flow to a gas burner. Furthermore, Casey does not disclose a valve assembly having a MEMS valve for controlling the gas flow. Applicants submit that the valve assemblies of Charron and Casey are not compatible and the teachings of Charron and Casey cannot be combined without complete redesign of either system.

The Examiner argued that Casey teaches a burner-valve arrangement including a plurality of burners and a plurality of valves arranged in parallel, and that such an arrangement has the clear and obvious benefit of providing enhanced fuel flow and combustion. The Examiner admitted that Casey does not specifically recite microvalves, but argued that it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the arrangement as taught by Casey into the invention disclosed by Charron.

Applicants observe first that neither Charron nor Casey discloses a MEMS valve having a plurality of independently controllable valves for providing a variable gas flow. Further, the teachings of Charron and Casey cannot be combined without complete redesign of either system. The individual gas valves disclosed in Charron are mounted *on a common rod* and are employed to control the intake to the burner and the pilot light, respectively. That is, for example, if multiple valves in parallel were provided for burner gas flow, it is unclear how the pilot light valve would or could be controlled. It would not have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the arrangement of Casey in the water heater of Charron as it would require complete redesign of the system. Furthermore, it would not have been obvious to replace the gas valves of Charron or Casey with MEMS valve having a plurality of independently controlled microvalves in parallel fluid communication with the burner, as again these microvalves then provide no control rod for cooperative regulation of pilot light flow.

Control schemes of the valves disclosed in Charron and Casey are not compatible.

Applicants submit that certain of the pending claims recite a microvalve controller for controlling the opening of each of the microvalves in the micro-electro-mechanical valve. In particular, the controller controls the opening of at least some of the plurality of controllable valves independently to provide a desired gas flow.

The Examiner argued that Charron discloses a controller with modulation has and cited the passage at col. 5, lines 4-19 in support of the rejection.

The cited passage reads as:

> Since this amplitude is furthermore related, apart from the current gain of transistor 15, to the value of the current in the base of this same transistor and since this latter is related, through Ohm's law, to the ohmic value of the resistive sensor 40, it will be readily understood that whenever the temperature of the hot water produced approaches the temperature T from which the ohmic value of sensor 40 increases rapidly, the base current of the transistor also decreases very rapidly, causing the same rapid decrease of the amplitude of the half waves in the mobile coil and, consequently, a decrease just as rapidly of the rate of modulation of the micro-electro valve, which causes a decrease in the differential pressure acting on membrane 33, which finally rises towards seat 32, thus reducing the flow of the gas to the burner 43.

As can be seen from the cited passage, Charron does not disclose a controller to control the opening of the plurality of controllable valves independently in parallel fluid communication with the burner based upon an issued command for a desired gas flow. In fact, Charron teaches the control of the valves based upon the flow of drawn water. As soon as the flow of drawn water exceeds the minimum threshold provided for operation of the apparatus, the water valve opens gradually and the gas valves also open, which supply gas to the compartments and to the pilot light. *See* Charron, col. 4, lines 1-5.

Further, Casey discloses a modulator, or a modulating device that is in electrical communication with valves to electronically control and/or operate movement of each valve to incrementally modulate the heat input rate of the gas fired heater. Clearly, the control schemes for operation of the valves described in Charron and Casey are not compatible and cannot be combined to achieve the control strategy

described in the present application. That is, the device could not control multiple valves in parallel, and a pilot light based on water flow, while implementing Casey's control scheme, without completely redesigning either the Charron or the Casey device.

Motivation of suggestion for combination of references proposed by the Examiner is unreasonable.

The Examiner argued that it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the arrangement as taught by Casey into the invention disclosed by Charron, so as to provide for enhanced control of fuel flow and combustion because it is within the general skill of one of ordinary skill in the art to *select a known structure on the basis of its suitability for the intended use*. *See* Office Action, page 4.

Applicants concede that any design in the mechanical and electrical arts is based upon suitability for the intended use. However, this alone is insufficient to warrant complete redesign of the structure of Charron or Casey. That is, this general statement alone cannot possibly provide the requisite motivation or suggestion needed to support a *prima facie* case of obviousness. Applicants therefore submit that independent claims 1, 10, 17 and 19 are allowable and respectfully request the Examiner to reconsider rejection of the claim.

With regard to dependent claims 2-9, 12-16, 18 and 20-23, these claims depend directly or indirectly from allowable claims 1, 10, 17 and 19, and are therefore considered to be allowable at least by virtue of their dependency from an allowable base claim.

Conclusion

In view of the remarks and amendments set forth above, Applicants respectfully request allowance of the pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

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